Forensic DNA Fingerprinting Kit

Mastering Inquiry Can Be Easy with Bio-Rad

Use the following 20 questions for student-based inquiry about the processes contained in this kit. Whenever possible let your students develop protocols and choose the variables to test.

Level 1 questions are simple to adapt and do not add extra days to the running of this laboratory. An example of how to organize and execute a Level 1 question is given below.

Level 2 questions may add a few days onto the lab and may require some additional materials to answer.

Level 3 questions are for students seeking a real challenge and will require additional days, techniques, and materials to answer.

EXAMPLE

Level 1, Question #3: How important is digest time for a DNA digest?

Have two student groups run the standard protocol time for 45 minutes at 37°C. These groups will act as the control for the experiment. Instruct two other student groups to run the protocol for 5 min at 37°C, two other student groups for 20 min at 37°C, and the last pair of student groups for 50 min at 37°C. **Pairs** of student groups running the same protocol time at the same temperature provide **confirmation of results**. After running DNA digests on gels, have students **compare band intensities** between the gels.

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Level 1

1. How important is enzyme concentration for a DNA digest?
2. How important is DNA concentration (substrate) for a DNA digest?
3. How important is digest time for a DNA digest?
4. How important is digest temperature for a DNA digest?
5. How important is thoroughly mixing the sample prior to a DNA digest?
6. How important is agarose concentration in the gel for a DNA digest?
7. How important is buffer concentration in the chamber for a DNA digest?
8. How important is the voltage at which the gel is run for a DNA digest?
9. How much of a DNA digest is needed to stain a gel with Fast Blast™ or other "safe" stains?
10. Does buffer concentration change DNA migration rate?

Level 2

11. How important is restriction enzyme concentration when adding more than one enzyme to the same tube?
12. How important is overall reaction volume?
13. How important is restriction buffer concentration when doing a restriction digest?
14. Are enzymes as effective after exposure to ultraviolet (UV) light?
15. Can I mutate DNA using UV light? Does this change restriction sites?

Level 3

16. If I cut the DNA sample, ligate the pieces together, then perform another restriction digest, will I get the same restriction pattern?
17. Can I ligate precut samples together to make a plasmid?
18. Can I cut a band out of the gel and ligate it into a plasmid?
19. Can I make a restriction map of a known plasmid using multiple restriction enzymes?
20. Why do some enzymes exhibit star activity when reaction conditions are not optimal?

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